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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,259	03/31/2004	Mukul P. Renavikar	42P19022	9845

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EXAMINER

LE, DUNG ANH

ART UNIT PAPER NUMBER

2818

DATE MAILED: 08/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary

Application No.

10/816,259

Applicant(s)

RENAVIKAR ET AL.

Examiner

DUNG A. LE

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) 15-28 and 38-46 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 10, 12, 14, 25 and 29-32 is/are rejected.
- 7) ☒ Claim(s) 6-9, 11, 13, 33, 34, 36 and 37 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
 Paper No(s)/Mail Date ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other; ____.

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DETAILED ACTION

Oath/Declaration

The oath/declaration filed on 3/31/2004 is acceptable.

Election/Restriction

Application's election without traverse of Group of Claims 1-14 and 29-37, drawn to process of making a semiconductor device is acknowledged for prosecution in the subject application. Applicants have the right to file a divisional, continuation or continuation-in-part application covering the subject matter of the non-elected claims.

Applicants are reminded to cancelled non-elective claims.

Specification

The specification is objected to for the following reason:

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed (see MPEP § 606.01).

Note that, the claims are directed to semiconductor device instead of to a method of making a semiconductor device.

The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections

Set of claims 1- 14

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3 and 4 are rejected under 35 USC 102 (e) as being anticipated by Li et al. (6,756,620 B2).

Li et al. teach a apparatus (specially fig. 5) comprising:

a first metal electrode layer 118;

a metal nitride layer 124 (col 3, lines 30-35) adjacent to the first metal electrode layer 118;

a polymer ferroelectric layer 126 (col 6, line 35) adjacent to the metal nitride layer 124;

a metal oxide layer 132 (col 3, line 50 –55) adjacent to the polymer ferroelectric layer; and

a second metal electrode layer 134 adjacent to the metal oxide layer;

wherein the metal nitride and metal oxide layers contain excess holes to recombine with electrons injected from the first and second metal electrode layers.

Regarding claim 3, the polymer ferroelectric layer is polyvitiylidene fluoride (col 4, line 58).

Regarding claim 4, the polymer ferroelectric layer is polyvinylidene fluoride trifluoroethylene copolymer (col 4, line 58).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 5 and 10 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Li et al. in view of the following remark.

Regarding claim 2, Li et al. disclose the claimed invention as applied to claims 1 except for the first metal electrode layer and second metal electrode layer are tantalum

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the first metal electrode layer and second metal electrode layer are tantalum, because Tantalum is commonly used metal for making electrodes to enhance their conductivity, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use.

Regarding claim 5, Li et al. disclose the claimed invention as applied to claims 1 except the metal nitride layer is tantalum nitride.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the metal nitride layer is tantalum nitride, because tantalum nitride is commonly used metal nitride, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the applicable use.

Regarding claim 10, Li et al. disclose the claimed invention as applied to claims 1 except the metal oxide layer is tantalum oxide.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the metal oxide layer is tantalum oxide, because tantalum oxide is commonly used metal oxide, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the desired purpose.

Set of claims 29- 37

Claim 29, 30 and 31 is rejected under 35 USC 102 (e) as being anticipated by Li et al. (6,756,620 B2).

Li et al. teach an apparatus comprising: a metal nitride layer 124; a polymer ferroelectric layer 126 adjacent to the metal nitride layer; a metal oxide layer 132 adjacent to the polymer ferroelectric layer; wherein the metal nitride and metal oxide layers include a plurality of electron traps (fig. 6).

Regarding claims 30 and 31, wherein the polymer ferroelectric layer is poly-vinylidene fluoride and wherein the polymer ferroelectric layer is a polyvinylidene fluoride trifluoroethylene copolymer (col 4, line 57).

Claims 32, 35 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Li et al. in view of the following remark.

Regarding claim 32, this claim is rejected under the same rationale set forth above to claim 5.

Regarding claim 35, this claim is rejected under the same rationale set forth above to claim 10.

Reasons for Indication of Allowable Subject Matter

Claims 6-7, 8-9, 11, 13, 33- 34 and 36- 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, since the prior made of record and considered pertinent to the applicant's disclosure does not teach or suggest the claimed limitations. Li et al. (U.S. Patent No. 6756620 B2) and Background of Invention , taken individually or in combination, do not teach the claimed invention having **(Regarding claim 6, 33)** the tantalum nitride is doped with hafnium to create excess holes in the tantalum nitride lattice; **(Regarding claim 8)** wherein the tantalum nitride is deposited in the presence of excess nitrogen to create excess holes in the tantalum nitride lattice; **(Regarding claim 11 and 36)** wherein the tantalum oxide layer is doped with hafnium to create excess holes in the tantalum oxide lattice and **(Regarding claim 13)** wherein the tantalum oxide layer is deposited in the presence of excess oxygen to create excess holes in the tantalum oxide lattice.

If Applicants are aware of better art than that which has been cited, they are required to call such to attention of the examiner.

When responding to the office action, Applicants' are advice to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dung A. Le whose telephone number is (571) 272-1784. The examiner can normally be reached on Monday-Tuesday and Thursday 6:00am- 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The central fax phone numbers for the organization where this application or proceeding is assigned are (571)272-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For

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more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DUNG A. LE 
Primary Examiner
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